Summarising my results for 1899, the figures are :—

	Objects.		Rotation Period. h	m	s
27	White and dark equatorial spots	...	9	50	24·6
16	North tropical spots	lat. 12°–15° N.	9	55	28·8
3	Spots in S. hemisphere	lat. 25°–30° S.	9	55	18·6
2	„ „	lat. 40°–50° S.	9	55	9·2
1	„ N. „	lat. 25°–30° N.	9	55	29·8
1	„ „	„ ...	9	55	53·5
	Red-spot-hollow in S. hemisphere ...	...	9	55	41·9

Bristol: 1899 *September* 21.

Early History of the Great Red Spot on Jupiter.

By W. F. Denning.

In the Supplementary Number of the *Monthly Notices*, 1898, I gave some particulars of observations of objects apparently identical with the great red spot on *Jupiter*, as their positions and rate of motion were found consistent with one another. The varying period of rotation was traced back to Gledhill's first accurate recognition of the ellipse on 1869 November 14. Since this paper was published I have collected many additional observations and drawings of the hollow in the great southern equatorial belt, or of the ellipse, extending back to 1831 September 5. Though the red spot or its modification, the ellipse, appears to be quite wanting from many of the drawings, yet a very well marked hollow in the south equatorial belt may be safely presumed to accurately indicate its position, as it has done in several recent years. Before 1857 the oval spot appears to have been indistinguishable, and was probably covered with material outlying it above the surface of *Jupiter*. The Rev. W. R. Dawes in 1857 figured an object similar to it in *Monthly Notices*, vol. xviii. p. 50, and Sir William Huggins has sent me his drawings (very excellent copies of which were kindly made for this purpose by Lady Huggins) from 1858 December to 1860 April, and in many of these a well-defined ellipse with dark ends is shown in the south hemisphere. I am also much indebted to Mr. A. Stanley Williams and to Mr. W. H. Wesley for copies of many of Schwabe's drawings of *Jupiter* between 1831 and 1856. These were taken from the MS. volumes of Schwabe's observations in the possession of the R.A.S. Mr. J. Baxendell, of Southport, has also sent me some copies of papers published by his father, the late Joseph Baxendell, F.R.A.S., which contain some well-executed delineations of the hollow in the south equatorial belt (see *Monthly Notices*, vol. xx. p. 244). In the *Memoirs of the*

Lit. and Phil. Society of Manchester, session 1859-60, Mr. Baxendell gave eight observed transits of a dark spot in about $28\frac{1}{2}°$ * south latitude, visible in the months from 1859 January to April. He determined its mean rotation period as $9^h\ 55^m\ 37^{s}\cdot812$, and there is no doubt whatever from a comparison with Sir William Huggins's drawings at about the same period, that this spot was really the dark following end of the ellipse. If twenty-seven minutes ($=16\frac{1}{2}°$ of longitude) are deducted from Mr. Baxendell's transit times they agree as nearly as possible with the estimated times of transit of the middle of the ellipse figured on many occasions by Sir William Huggins. In the following table this deduction has therefore been made in regard to the eight observations alluded to, which have been marked with an asterisk to distinguish them from the other transit times, all of which are dependent upon estimations from the position of the object east or west of the central meridian on drawings.

The transit times, being nearly all adopted from sketches which do not always represent the exact position of the spot or hollow at the minute the sketches were dated, may be sometimes erroneous to the extent of as much as 20 minutes, or possibly, in an exceptional case, 30 minutes. But even a misplacement of this large amount does not seriously impair the value of the rotation period when it is deduced from several years of observation. Thus, an error of 30 minutes would make one second difference in the period of rotation based on two years' observation, 0·68 second on 3 years, 0·54 on 4 years, and 0·41 on 5 years. This is, however, an extreme case, and I have endeavoured to avoid so large an error by testing and correcting the transits employed, by others, whenever practicable, obtained at nearly the same epoch.

Observations of the Hollow in the Great Southern Equatorial Belt or of the Red Ellipse in the South Hemisphere of Jupiter. 1831 *September* 5 *to* 1869 *November* 14.

Observer.	Year, month, and day.	Estimated transit time.	G.M.T. of sketch.	Position of object relatively to the C.M.
		h m	h m	°
H. Schwabe	1831 Sept. 5	8 21	8 56	21 W.
,,	19	9 51	9 11	24 E.
,,	Nov. 5	3 46	3 56	6 W.
,,	1832 Oct. 9	7 31	8 11	24 W.

* This is several degrees south of the position of the red spot in recent years, but it by no means negatives the assumption of identity. The spot varies in latitude (possibly at regular periods) as well as in longitude. Professor G. W. Hough has made a series of measures of the position of the red spot during the last twenty years with a refractor of $18\frac{1}{2}$-inch aperture, and says the object "has drifted in latitude, the total displacement being 2″·1 of arc." The maximum south latitude was in 1886, when the spot was 7″·41 distant from the equator, and the minimum in 1892, when the distance was 5″·32. This represents a difference in latitude of about 7°.

Observer.	Year, month, and day.	Estimated transit time.	G.M.T. of sketch.	Position of object relatively to the C.M.
		h m	h m	°
H. Schwabe	1840 Apr. 26	8 51	9 26	21 W.
,,	1845 Dec. 2	5 36	3 56	61 E.
,,	1850 Feb. 26	6 31	6 41	6 W.
,,	1851 May 10	7 26	7 3	14 E.
,,	1852 June 25	7 1	7 11	6 W.
,,	July 2	...	? 8 41	25 E.
,,	1855 Sept. 22	3 51	5 56	75 W.
,,	29	4 50	5 18	17 W.
,,	Oct. 23	4 11	4 41	18 W.
,,	Nov. 9	4 15	3 56	$11\frac{1}{2}$ E.
,,	21	...	$4\frac{1}{2}^h$–$6\frac{1}{2}^h$	66 W.
,,	26	2 56	3 41	27 W.
,,	1856 Aug. 31	8 11	9 11	36 W.
,,	Sept. 7	8 56	9 11	9 W.
,,	9	10 41	9 11	54 E.
,,	Oct. 20	9 11	8 11	36 E.
*Rev. W. R. Dawes	1857 Nov. 27	7 20	8 10	30 W.
†Sir W. Huggins	1858 Dec. 29	10 20	10 50	18 W.
,,	1859 Jan. 15	9 26	9 40	$8\frac{1}{2}$ W.
‡J. Baxendell	23	6 0	...	...
,,	Feb. 6	7 36	...	...
Sir W. Huggins	10	10 50	10 45	3 E.
J. Baxendell	11	6 38	...	...
Sir W. Huggins	13	8 15	8 45	18 W.
,,	23	6 20	6 40	12 W.
J. Baxendell	23	6 38	...	...
,,	Mar. 7	6 28	...	...
,,	Apr. 7	7 0	...	...
,,	9	8 34	...	...
,,	21	8 35	...	...

* The drawings by Dawes in 1857 are in *Monthly Notices*, vol. xviii. p. 50. On December 5 of the year named the *f* end of the ellipse is shown just passing off west limb, but the drawing was probably made at $6^h\ 30^m$ instead of $7^h\ 30^m$ as stated.

† *Observatory*, vol. v. p. 49.

‡ The eight transit-times due to Mr. Baxendell in 1859 were actually observed by him.

Observer.	Year, month, and day.	Estimated transit time.	G.M.T. of sketch.	Position of object relatively to the C M.
		h m	h m	°
*J. W. Long	1860 Feb. 29	7 55	7 45	6 E.
†Sir W. Huggins	Mar. 2	9 40	9 0	24 E.
‡J. Baxendell	2	9 45	9 24	12½ E.
Capt. W. Noble	2	10 10	10 2	5 E.
‡J. Baxendell	5	7 32	7 18	8½ E.
Capt. W. S. Jacob	12	8 10	7 40	18 E.
Capt. W. Noble	1863 Apr. 28	9 40	9 40	on C.M.
§N. E. Green	May 7	12 10	11 30	24 E.
Capt. W. Noble	7	12 20	10 55	51½ E.
,,	17	10 25	9 35	30 E.
T. W. Backhouse	1864 July 19	8 35	9 20	27 W.
,,	1867 Aug. 30	10 45	10 10	21 E.
Capt. W. Noble	Sept. 13	12 10	11 54	9½ E.
J. Gledhill	1869 Nov. 14	10 50	..	...

There can be no doubt that, in addition to this, much other evidence of a corroborative nature might be obtained by an exhaustive search amongst old records of Jovian observations. But the above are amply sufficient for the purpose of deriving a trustworthy rotation period for a considerable part of the whole interval. Additional data would, however, be useful for the periods from 1831 to 1850, and 1860 to 1869. Mr. A. S. Williams informs me that Schmidt obtained 300 or 400 drawings of *Jupiter* between 1843 and 1880, and if these could be consulted they would undoubtedly supply much reliable evidence on the early history of the red spot and its surroundings.

From a selection of some of the best observations in the foregoing summary I have worked out the rate of rotation of the spot or hollow in the south equatorial belt, in various years, as follows :—

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* The drawing appears in *Monthly Notices*, vol. xx. p. 244.

† *Observatory*, vol. v. p. 49, but the date is there erroneously given as 1858 March 2.

‡ *Monthly Notices*, vol. xx. p. 244. Capt. Jacob's drawing of 1860 March 12 will also be found here.

§ *Astronomical Register*, 1872, fig. 4.

*Hollow in S belt, or ellipse.** *Rotation Period* 1831 *Sept.* 5 *to* 1869 *Nov.* 14.

Observers.	Dates of the Observations.				Interval.			Rotations.	Corrected Rotation Period.			Daily Rate.
				h m	d	h	m		h	m	s	°
H. Schwabe ...	1831	Sept.	5	8 21								
					399	23	10	967	9	55	32·5	870·47
,, ...	1832	Oct.	9	7 31								
					2756	1	20	6663	9	55	34·5	870·42
,, ...	1840	Apr.	26	8 51								
					2045	20	45	4946	9	55	35·2	870·40
,, ...	1845	Dec.	2	5 36								
					1547	0	55	3740	9	55	35·4	870·40
,, ...	1850	Feb.	26	6 31								
					438	0	55	1059	9	55	35·6	870·39
,, ...	1851	May	10	7 26								
					411	23	35	996	9	55	35·3	870·40
,, ...	1852	June	25	7 1								
					1183	20	50	2862	9	55	36·1	870·38
,, ...	1855	Sept.	22	3 51								
					353	6	50	854	9	55	37·3	870·35
,, ...	1856	Sept.	9	10 41								
					443	20	39	1073	9	55	37·6	870·34
Rev. W. R. Dawes	1857	Nov.	27	7 20								
					397	3	0	960	9	55	37·4	870·35
Sir W. Huggins	1858	Dec.	29	10 20								
					428	23	32	1037	9	55	38·4	870·32
Sir W. Huggins, Capt. W. Noble, J. Baxendell ...	1860 †	Mar.	2	9 52								
					1171	0	33	2831	9	55	35·5	870·40
Capt. W. Noble	1863	May	17	10 25								
					1580	1	45	3820	9	55	34·5	870·42
,,	1867	Sept.	13	12 10								
					792	22	40	1917	9	55	34·5	870·42
J. Gledhill ...	1869	Nov.	14	10 50								
H. Schwabe ...	1831	Sept.	5	8 21								
					13950	2	29	33728 ‡	9	55	35·3	870·40
J. Gledhill ...	1869	Nov.	14	10 50								

For the interval elapsed since 1869 November 14 to the last observation obtained at Bristol, I find the following :—

				h m	d	h	m	R.	h	m	s	°
J. Gledhill ...	1869	Nov.	14	10 50								
					10897	18	51	26346	9	55	37·9	870·33
W. F. Denning	1899	Sept.	16	5 41								

For the entire period of 68 years since 1831 :—

H. Schwabe ...	1831	Sept.	5	8 21								
					24847	21	20	60074	9	55	36·4	870·37
W. F. Denning	1899	Sept.	16	5 41								

* For a similar table to this, carrying the observations from 1869 to 1898, see *Monthly Notices*, lviii. p. 491.

† In this case I have taken the mean transit time derived from three good drawings made on the same evening, and all representing the hollow as a very conspicuous feature.

‡ Three more rotations than the total of the number included in the periods above. This is because Jupiter apparently loses one rotation during a revolution round the Sun, and the rotations given for the shorter periods are really the number observed, This in every case is less by a fractional part than the actual total. Thus, in the second period in the table between 1832 and 1840 the number of rotations observed was 6663, but the actual number performed by the planet was 6663 and two-thirds.

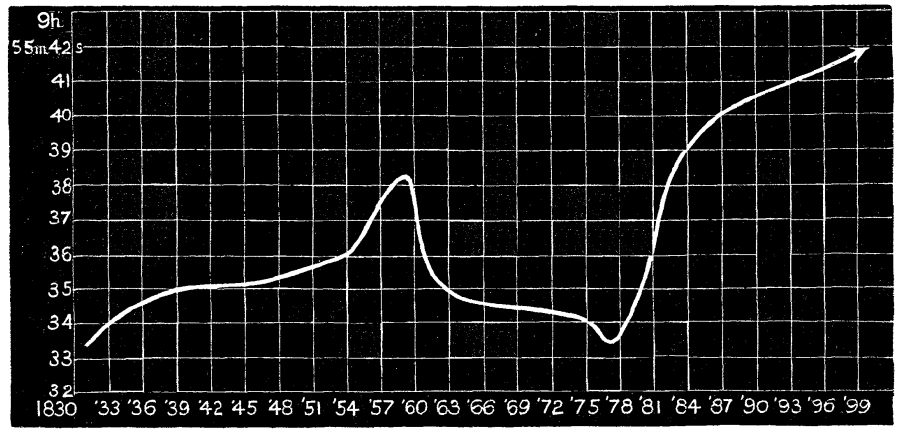
For several of the longer periods, where no intervening observations afford a criterion, the number of rotation periods has necessarily been assumed. It may be thought, therefore, that the precise number employed is open to doubt ; but there is little evidence to support this view, as the resulting rotation periods all show a consistent agreement, and there are a few observations near the beginning or closing of several of the periods which prove that the figures are correct. Moreover, if one rotation too many or too little were adopted, it would throw the periods out considerably, and indicate some extraordinary fluctuations in the rate of the spot. Thus, for the longest period (embracing $7\frac{1}{2}$ years) in the table, the assumed number of rotations is 6663. This number gives a period presenting a most suggestive agreement with the others. If 6662 rotations had been adopted, the resulting period would have been $9^h\ 55^m\ 40^s$, and if 6664, $9^h\ 55^m\ 29^s$. These figures are discordant with the rates exhibited during the periods preceding and following. But they are not altogether impossible in view of the irregularities which have been occasionally observed in the motion of the spot. For the smaller periods in the table the number of rotations may be safely regarded as correct, as any other number would give an abnormal period. Still, it is hoped that to ensure absolute confidence in the results obtained, some additional observations will be found to fill up the longer intervals. In consulting old records, references are occasionally met with which undoubtedly refer to the red spot or the accompanying hollow in the southern belt. Thus, Dr. O. Lohse, of Bothkamp, quotes the following observation by the Bonds at Harvard College Observatory. 'On February 3, 1848, at $9^h\ 30^m$ M.S.T. (Camb.) three belts only were seen. The broad one lying a little south of the equator had no longer its sides parallel, as on January 28, but a deep hollow on the south edge, reaching nearly across on the *p.* side.'

Taking the average rotation periods in the foregoing table (1831 to 1869), and those in my previous paper on the same subject (*Monthly Notices*, vol. lviii. p. 491), the smoothed rate in successive years appears to have been as follows :—

Year.	h	m	s	Year.	h	m	s	Year.	h	m	s
1831 –	9	55	33·3	1841 –	9	55	35·0	1851 –	9	55	35·7
1832 –			33·6	1842 –			35·1	1852 –			35·8
1833 –			33·9	1843 –			35·1	1853 –			35·9
1834 –			34·1	1844 –			35·2	1854 –			36·0
1835 –			34·3	1845 –			35·2	1855 –			36·1
1836 –			34·5	1846 –			35·3	1856 –			36·7
1837 –			34·7	1847 –			35·3	1857 –			37·5
1838 –			34·8	1848 –			35·4	1858 –			38·0
1839 –			34·9	1849 –			35·5	1859 –			38·3
1840 –			35·0	1850 –			35·6	1860 –			37·1

Year.	h	m	s	Year.	h	m	s	Year.	h	m	s
1861	9	55	35·9	1874	9	55	34·2	1887	9	55	40·1
1862	—		35·3	1875	—		34·0	1888	—		40·2
1863	—		35·0	1876	—		33·7	1889	—		40·4
1864	—		34·8	1877	—		33·4	1890	—		40·5
1865	—		34·7	1878	—		33·7	1891	—		40·6
1866	—		34·6	1879	—		34·1	1892	—		40·8
1867	—		34·5	1880	—		35·2	1893	—		40·9
1868	—		34·5	1881	—		36·3	1894	—		41·0
1869	—		34·5	1882	—		37·3	1895	—		41·1
1870	—		34·4	1883	—		38·2	1896	—		41·3
1871	—		34·4	1884	—		39·0	1897	—		41·5
1872	—		34·3	1885	—		39·6	1898	—		41·7
1873	—		34·3	1886	—		39·9	1899	—		41·9

The rotation period increased gradually and regularly from about $9^h\ 55^m\ 33^s$ in 1831 to about $9^h\ 55^m\ 38^s$ in 1859, when it rapidly decreased to about $9^h\ 55^m\ 36^s$ in 1861. Then the decrease became very gradual, and during the fifteen years from 1865 to 1879 inclusive it seems to have varied little from $9^h\ 55^m\ 34^s{\cdot}3$. In 1880 and three following years the period increased rapidly, so that in 1884 it was $9^h\ 55^m\ 39^s$. During the next fifteen years the increase was continued, but very slowly, so that in 1899 the period was $9^h\ 55^m\ 41^s{\cdot}9$. A diagram will, however, exhibit the variations which have occurred more strikingly than any description :—



Variation in Rotation period of the Red Spot and hollow in S. belt during the 68 years from 1831 to 1899.

It has often been suggested that the great red spot of recent years may be identical with the large spot discovered on *Jupiter* in 1664 by Robert Hooke and seen in 1665, and following years by J. D. Cassini. The *Phil. Trans.* vol. i. p. 3 (abridgment) contains the following paragraph concerning the spot :—

"The ingenious Dr. Hooke did some months since intimate to a friend of his that he had, with an excellent 12-feet telescope, observed, some days before he then spoke of it (viz., on 1664 May 9 O.S.), about nine o'clock at night, a spot in the largest of the three obscure belts of *Jupiter*; and that, observing it from time to time, he found that, within two hours after, the said spot had moved east to west about half the length of the diameter. It is situated in the northern part of the southern belt. Its diameter is one-tenth of *Jupiter*; its centre, when nearest, is distant from that of *Jupiter* about one-third of the semi-diameter of the planet."

In the same volume of the *Phil. Trans.*, p. 60, appears the following :—

"*Hooke's Permanent Spot on Jupiter.*

"M. Cassini, after many observations during the summer of 1665, found that the period of its apparent rotation is $9^h\ 56^m$. He continued to observe this spot till the beginning of 1666, when *Jupiter* approached to the beams of the Sun; but after he had got out of them it was difficult to be discerned. But, 1672 January 19, N.S., observing *Jupiter* at $4\frac{3}{4}$ hours in the morning, he perceived in the same place of his disc the figure of the same spot adhering to the same southern belt. It had already gone over the half of this belt, and he saw it advance gradually towards the western limb, to which it seemed very near at $6\frac{1}{4}$ hours. By the celerity of its motion near the centre, and by the place when he had begun to see it, he judged it might have been in the middle of the belt at 4 hours and 35 minutes in the morning. And as he set about making ephemerides of its motion for 1672, he perceived that in those he made for 1666 this spot had been in the middle of *Jupiter* the same day, viz. January 19, at the same hour, so that in six years, of which one is a bissextile, it is found to have in respect of the Earth at least 5294 revolutions of $9^h\ 55^m\ 58^s$, one revolution with another, and at most 5295 revolutions of $9^h\ 55^m\ 51^s$, forasmuch as he was assured of the preciseness of one mean revolution to one-eighth of a minute. Till that time he never observed an immediate return of this spot after $9^h\ 56^m$, because that after the appearing of the spot *Jupiter* had not continued long enough above the horizon to observe him with due distinctness. But the night after March 1, at $7\frac{1}{2}$ hours in the evening, he saw this spot in the middle of the belt; and at $5^h\ 26^m$ in the following morning he saw it again return precisely to the same place." . . . "The next day" (vol. i. p. 706) "he made a report of these observations to the Royal Academy of Sciences, and predicted that the spot would arrive again at the midst of the belt on March 3 at 8 minutes after 9 o'clock; whereupon the assembly deputed M. Biot and M. Mariotte to be present at the observatory, who, being come to the Royal Observatory, began to see, at 4^m after 8 o'clock, the spot, already somewhat removed from the eastern limb, but yet

obscure and small. At 47^m after 8 o'clock they saw it very distinctly advancing towards the middle of the belt. From 5^m 40^s after 9 o'clock until 8^m after 9 o'clock they saw it in the midst of the belt. At 15^m after 9 o'clock it had passed the middle, and was come nearer to the western limb. And a little after, the heavens being overcast, they could then observe no further."

The spot appears to have been intermittently visible, for we find references to it as follow :—

1664 May 19 (N.S.) Discovered by Hooke.
1665 to 1667. Frequently seen by Cassini, but faint, in 1667.
1672 January 19. Re-detected by Cassini, and followed to end of 1674.
1677. Seen, but disappeared in the same year.
1685 March. Re-observed, and continued in view until 1687 October.
1690. Seen for a short time.
1691. Reappeared, but became invisible again in 1693.
1694. Seen.
1708. Seen.
1713. Re-observed by Maraldi, but finally disappeared after this year.

It would be interesting to consult the early volumes of the *Académie des Sciences* and discuss the observations. The rotation period might thus be determined, together with its changes of rate, for the fifty years from 1664 to 1713. Derham says that Cassini's observations are to be found in *Memoires de Mathem. et Phisique*, 1692 January.

From the date of Hooke's discovery of the spot on 1664 March 19 (N.S.) to Cassini's observation of the same object on 1666 January 19 (N.S.) I find the object performed 1472 rotations, with a corrected mean period of 9^h 55^m $58^s{\cdot}7$. Between Cassini's observation in 1666 January and others which he effected in 1672 January and March the motion appears to have increased, for from 5402 rotations the period was 9^h 55^m $54^s{\cdot}2$. If during the nine years from 1664 to 1672 inclusive the motion increased in a gradual manner, the annual values for the rotation period were probably as under :—

	h	m	s		h	m	s
1664	9	55	59	1669	9	55	54
1665			58	1670			53
1666			57	1671			52
1667			56	1672			51
1668			55				

Cassini says that between 1666 January 19, 4.35 A.M. and the same date and hour in 1672, the planet made at least 5294 rota-

tions, or at most 5295. The real number appears to have been 5294.

In 1713, according to J. P. Maraldi, the rate was $9^h\ 56^m$, so that the maxima occurred in about 1664 and 1713. If we adopt a cycle of $48\frac{1}{2}$ years as representing the changes, then maxima are also indicated for 1761, 1810, 1858, and 1907. This conforms very nearly with the slow rate observed for the red spot in 1859. It is also noteworthy that a period of about forty-eight years corresponds with the rapid motion of the spot exhibited in about 1831 (perhaps the minimum period really occurred in 1829, for which we have no observations), and 1877. These, however, are merely suggestions from insufficient data, the more complete investigation of old records would probably lead to more definite and certain conclusions.

In 1773, Jacques de Sylvabelle determined the period of a spot on *Jupiter* as $9^h\ 56^m$, but I am not aware whether this object offered any resemblance either in its form or position to Hooke's spot of 1664, or to the red spot of our own time. If the latter can be assumed to be identical with Hooke's spot of 1664 May 19, and the mean rate of rotation to have been $9^h\ 55^m\ 40^s$ during the long interval of $235\frac{1}{2}$ years to 1899 September 16, then the planet will have rotated 207,780 times since the spot was first discovered. The ancient marking is often called "Cassini's spot," though Cassini was certainly anticipated by Hooke, but the latter seems to have curiously neglected this feature and to have scarcely thought it worth mention. On the other hand, Cassini followed it with great perseverance, and derived some interesting conclusions from its apparition; to him, therefore, belongs the most credit, and his name will always be closely associated with this interesting object.

In concluding, it may be mentioned that the supposed invisibility of the red spot in 1877 has sometimes been alluded to as a curious circumstance. When in opposition in June of that year the planet had a declination 23° S. of the equator, so it cannot be wondered at that this marking escaped observation in England. It was, however, seen at Sydney, N.S.W., by Mr. H. C. Russell, who writes me that, though during the summer of 1877 *Jupiter* was somewhat neglected in favour of *Mars*, the red spot was often observed. Its figure became so familiar that it was termed the "pink fish," it being somewhat fish shaped, the *p* end being round and the *f* end tapering. The observers having noticed its constancy in 1876 and 1877, regarded it as a permanent marking on the planet. Mr. Russell quotes one of his observations to the effect that on 1877 August 26, at 8 P M. (local time), the "pink fish" was just passing off the planet's limb. In 1876 the spot was frequently seen, and appears on many of the drawings made at the Sydney Observatory in May, June, and July of that year. From Mr. Russell's descriptions of the position of the object relatively to the central meridian in the various drawings alluded to, its times of transit must have been approximately as follows:

		Transit G.M.T. h m
1876 May	31	0 25
June	2	1 20
	7	0 25
	7	20 15
	9	21 47
	19	20 5
	29	18 35
July	1	0 5
	3	1 50

These times are fairly consistent with each other (considering the nature of the estimates), except the first one on May 31, which seems more than thirty minutes late.

Bristol: 1899 *September* 21.

Errata.

Monthly Notices, lviii. p. 484. The number of rotations for spot No. 1 should be 87 instead of 101, and for spots Nos. 12 and 13, 161 instead of 154.

On p. 491 the number of rotations between 1869 Nov. 14 and 1898 July 30 is stated as 25,346. This is the observed number; the actual number performed was 25,348 and about one-third.

Note on the Motion of Jupiter's Red Spot. By C. Flammarion.

The slackening motion of the spot has proceeded in fair accordance with the forecast given in Mr. Crommelin's Ephemeris to the effect that it would "follow the zero-meridian of System II. by about 52^m at the beginning of this Ephemeris (1898 December 10), and about 59^m at the end of it" (1899 September 18).

A considerable number of transits of the Red Spot region over the central meridian of *Jupiter* have been secured at Juvisy during the present apparition. Owing, however, to the extreme attenuation of the spot's intensity, and to the concomitant difficulty of the observations, the estimated times of transit do not refer to the centre of the red spot itself, but to that of the cavity in which it is located.

On 1899 May 30 the following transits were noted by M. Antoniadi:—

	h m
Passage of *p* shoulder	9 36 G.M.T.
Passage of centre of cavity	10 9·5 (Plate 1, Fig. 1).
Passage of *f* shoulder	10 43